



Annex 1

to Market Consultation for Dismantling and Fragmentation, Characterisation and Packaging of Reactor Internals, Reactor Pressure Vessels and Annular Tanks of Kozloduy Units 1-4

The decommissioning of KNPP Units 1 to 4 remained focused on the dismantling of large-size equipment in the Controlled Area. The current dismantling status is presented in the table below:

MAIN CA EQUIPMENT/ACTIVITY	UNIT 1	UNIT 2	UNIT 3	UNIT 4
FULLY DISMANTLED CONTROLLED AREA EQUIPMENT				
Steam Generator (SG) - disconnected and removed from their installation location	5 out of 6	2 out of 6	6 out of 6	6 out of 6
SGC hatches	3 out of 3	1 out of 3	3 out of 3	3 out of 3
SG transferred to TH	1 out of 6	1 out of 6	5 out of 6	5 out of 6
SG Auxiliary Systems	5 out of 6	2 out of 6	6 out of 6	6 out of 6
Main Coolant Pumps (MCP)	6 out of 6	6 out of 6	6 out of 6	6 out of 6
Bottom parts of the MCP	6 out of 6	6 out of 6	6 out of 6	6 out of 6
Main Isolating Valves (MIV)	12 out of 12	12 out of 12	12 out of 12	12 out of 12
Main Steam Lines (MSL)	✓		✓	✓
Main Coolant Pipelines	✓		✓	✓
Thermal insulation in SGC	✓	✓	✓	✓
Reactor Upper Block		✓		✓
WPS-3 (SVO-3)	✓	✓		
Thermal insulation of Relief Tank	✓		✓	✓
Thermal insulation of Pressuriser			✓	
SGC valve chamber			✓	✓
ON-GOING DISMANTLING WORKS				
	Dismantling of SGC valve chamber in Room A013/1	Dismantling of SG-2 and Thermal insulation of Relief Tank	Dismantling of Pressuriser	

The Controlled Area equipment planned for dismantling by SERAW in 2025, 2026 and 2027 is as follows:

➤ **For the year 2025**

Unit 1 – Reactor Upper Block and Lid, Reactor Protective Cover, 6th Steam Generator, Equipment in Steam Generators Compartment (SGC)

Unit 2 – Reactor Protective Cover, Equipment in Steam Generators Compartment (SGC)

Unit 3 – Reactor Upper Block and Lid, Reactor Protective Cover, Pressurizer

Unit 4 – Reactor Protective Cover, Relief Tank

➤ **For the year 2026**

Unit 1 – Pressurizer, Relief Tank,

Unit 2 - 4 out of 6 Steam Generators, Equipment in Steam Generators Compartment (SGC)

Unit 3 - Dismantling of jet vortex condenser

Unit 4 - Pressurizer, Dismantling of jet vortex condenser

➤ **For the year 2027**

Unit 1 – SVO-1, SVO-2

Unit 2 - Pressurizer, Relief Tank, SVO-1

Unit 3 – SVO-4

Unit 4 - Relief Tank

The re-baselined Integrated Project Schedule reflects the decision to outsource some specific reactor dismantling activities of each Unit (e.g., dismantling and fragmentation of Reactor Pressure Vessel, Reactor Core Barrel, Reactor Core Basket Reactor Guard Tube Bank and Annular Tanks). Please refer to the below schedule extract for more details:

Units 1 and 3

Task Name	Duration	Start	Finish
04.0507.6.5.2.6 Dismantling and fragmentation of Reactor Core Barrel by Contractor	112 days	Tue 23.5.28	Wed 25.10.28
04.0507.6.5.2.7 Dismantling and fragmentation of Reactor Core Basket by Contractor	55 days	Thu 26.10.28	Wed 10.1.29
04.0507.6.5.2.8 Dismantling and fragmentation of Reactor Guard Tube Bank by Contractor	65 days	Thu 11.1.29	Wed 11.4.29
04.0507.6.5.2.9 Drain and Decontaminate Spent Fuel Pool 3 after internals fragmentation and packaging by SERAW	20 days	Thu 12.4.29	Wed 9.5.29
04.0507.6.5.3 Dismantling and fragmentation of reactor pressure vessel by Contractor	175 days	Fri 13.4.29	Thu 13.12.29
04.0507.6.5.3.1 Draining Reactor shaft and setting RV in position for cutting by SERAW	10 days	Fri 13.4.29	Thu 26.4.29
04.0507.6.5.3.2 Installation and testing of RV fragmentation equipment by Contractor	9 days	Fri 27.4.29	Wed 9.5.29
04.0507.6.5.3.3 Reactor Vessel Fragmentation by Contractor	151 days	Thu 10.5.29	Thu 6.12.29
Milestone: Dismantling and Fragmentation of Reactor Internals and Reactor Vessel of Unit 3 by Contractor	0 days	Thu 6.12.29	Thu 6.12.29
04.0507.6.5.3.4 Decontaminate the fragmentation residues by SERAW	5 days	Fri 7.12.29	Thu 13.12.29
04.0507.6.5.4 Dismantling and fragmentation of Annular tank by Contractor	85 days	Fri 14.12.29	Thu 11.4.30
04.0507.13 Loading the activated material in RCC by Contractor	635 days	Tue 23.5.28	Mon 28.10.30

Units 2 and 4

Task Name	Duration	Start	Finish
04.0507.12.5.2.6 Dismantling and fragmentation of Reactor Core Barrel by Contractor	112 days	Thu 12.4.29	Fri 14.9.29
04.0507.12.5.2.7 Dismantling and fragmentation of Reactor Core Basket by Contractor	55 days	Mon 17.9.29	Fri 30.11.29
04.0507.12.5.2.8 Dismantling of Reactor Guard Tube Bank by Contractor	65 days	Mon 3.12.29	Fri 1.3.30
04.0507.12.5.2.9 Drain and Decontaminate Spent Fuel Pool 4 after internals fragmentation and packaging by SERAW	20 days	Mon 4.3.30	Fri 29.3.30
04.0507.12.5.3 Dismantling and fragmentation of reactor pressure vessel by Contractor	175 days	Tue 5.3.30	Mon 4.11.30
04.0507.12.5.3.1 Draining Reactor shaft and setting RV in position for cutting by SERAW	10 days	Tue 5.3.30	Mon 18.3.30
04.0507.12.5.3.2 Installation and testing of RV fragmentation equipment by Contractor	9 days	Tue 19.3.30	Fri 29.3.30
04.0507.12.5.3.3 Reactor Vessel Fragmentation by Contractor	151 days	Mon 1.4.30	Mon 28.10.30
Milestone: Dismantling and Fragmentation of Reactor Internals and Reactor Vessel of Unit 4 by Contractor	0 days	Mon 28.10.30	Mon 28.10.30
04.0507.12.5.3.4 Decontaminate the fragmentation residues by SERAW	5 days	Tue 29.10.30	Mon 4.11.30
04.0507.12.5.4 Dismantling and fragmentation of Annular tank by Contractor	85 days	Tue 5.11.30	Mon 3.3.31
04.0507.13 Loading the activated material in RCC	635 days	Tue 23.5.28	Mon 28.10.30

A Design Documentation Package for the Dismantling of the Primary Circuit and all associated systems, plant and equipment in Unit 1 was elaborated. The relevant technical documentation included within the said design will be provided to prequalifying tenderers as part of the future multi-stage tendering process. Potential tenderers will be expected to use the provided design documentation to familiarise themselves with the scope of the project and submit technical proposals for the implementation based on their individual proven experience and technological capabilities.

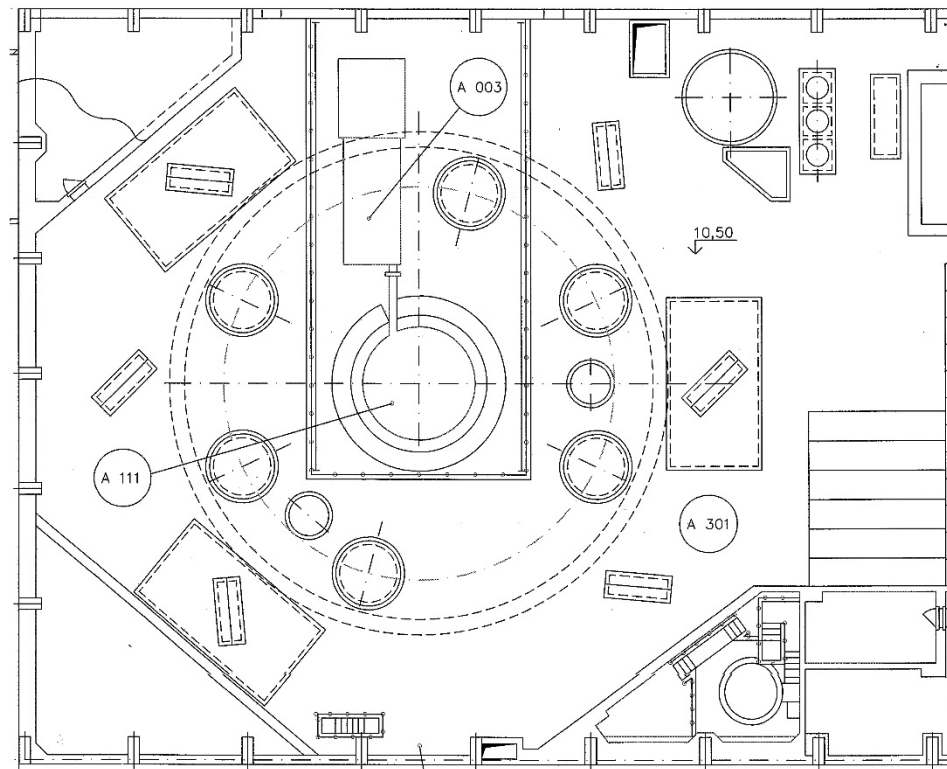
1. RPV internals for dismantling include:

- Reactor Guard Tube Bank;
- Reactor Core Basket;
- Reactor Core Barrel.

Equipment for the management of the activated components provided for in the Design Documentation Package (250/30 t electric bridge crane, RPV internals protection container, inspection shafts) is available and operational.

The Reactor Guard Tube Bank, Core Basket and Reactor Core Barrel must be dismantled in accordance with the operating procedures. Disassembly is to be carried out using the RPV internals container and the crane with a capacity of 250/30 t.

The lid for the RPV is to be mounted on the flange of the RPV by means of a 250/30 t bridge crane and fixed. Closing the RPV with the transport lid is a security measure. In addition to the closure of the RPV, the lid also serves as a shield during follow-up activities on A-111 (Figure 1).



1.1. Preparation for fragmentation

The equipment in room A-003 (shelves) is removed. Rooms A-003 and A-111 are ready for use.

After the removal of the RPV internals, the following equipment for handling and fragmentation of the RPV internals will be installed in rooms A-003, A 111 and A-301 and will be commissioned:

- Remote cutting system;
- Remote manipulation system;
- System for positioning and rotating the RPV internals;
- Support frame of the reactor containment vessel;
- Collection tank for the cut fragments;
- Robotic thermal cutting system;
- Mast Bandsaw
- Water treatment system;

After the installation of the reactor handling and fragmentation equipment of the RPV internals and the handling and transportation of the cut fragments, the operational areas for fragmentation, manipulation and transport operations with the cut fragments (rooms A-003 and A-111) are filled with demineralized water.

1.2. Fragmentation

The fragmentation of the reactor internals planned to be done remotely underwater.

1.3. Relocation and packaging of the fragments in primary packages

The individual sliced fragments are gripped by a remote telescopic manipulation system and transported to room A-003 (Spent Fuel Pool) where they are placed in primary packaging (baskets) for the respective secondary packaging (containers). The baskets are optimized in shape and size for the secondary containers to be used.

Depending on the activity of the fragments and the relevant biological protection requirements, different packages provided by SERAW will be used.

2. Reactor Pressure Vessels

The following equipment for handling and fragmentation of the RPV planned to be installed in rooms A-111 and A-301 and to be commissioned by the Contractor:

- Transport lid of RPV;
- Remote cutting system;
- Remote manipulation system;
- Robotic thermal cutting system;
- The lifting and rotating system of RPV;
- Main support of RPV;
- Water treatment system.

The reactor pressure vessel remains filled with water and to be closed with the transport lid - the transport lid is to be mounted on the flange of the RPV using the 250/30 t bridge crane and fixed. Closing the RPV with the transport lid is a safety measure. In addition to the closure of the RPV, the cover also serves as a shield during follow-up activities on A-111.

2.1. Dismantling and fragmentation of peripheral components in the area of the RPV flange

- Cutting of pipelines in room A-001 between elevations 1.08 m and +2.86 m;
- Fragmentation of the area above the annular water tank;

2.2. Dismantling and fragmentation of Nozzles on the RPV

2.3. Preparation of the RPV for transport to A-111

- Dismantling of the elements for fixing and securing the reactor vessel;
- Dismantling and fragmentation of the compensator (bottom) of the flange of the reactor vessel;
- Removing any remaining water from the reactor vessel.

3. Fragmentation of the reactor pressure vessel

- Separation of the bottom part of the RPV from the RPV;
- Fastening the RPV rail to the cable lift;
- Raising the RPV in room A-111 to the cutting position and positioning for cutting;
- Fragmentation of the RPV in the bottom-up direction to the flange area and the nozzle area and packaging of the cut fragments;
- Transportation of the flange area and the nozzle area of the RPV to the fragmentation area in room A-301;

- Fragmentation of the flange area and the nozzle area of the RPV using a diamond wire or band saw and packaging of cut fragments;
- Transportation of the bottom of the RPV to the fragmentation area in room A-301;
- Fragmentation of the bottom of the RPV using a diamond wire and package cut fragments;
- Filling of packages in room A-003, with high-level radioactivity fragments and transportation for intermediate storage;
- Filling 20-foot containers with low-level radioactivity fragments and transportation to the Size Reduction & Decontamination Workshop (SRDW).

Prior to completion of the works, the Contractor will decontaminate and disassemble the used technological equipment and transport off the KNPP site. If necessary, the Contractor will be also required to reinstate the SSC in RB-1 and RB-2 to their original state after any modifications made.